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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/628,946	07/28/2003	Daniel A. Kearl	10019358-1	9103

22879 7590 05/14/2007

HEWLETT PACKARD COMPANY
P O BOX 272400, 3404 E. HARMONY ROAD
INTELLECTUAL PROPERTY ADMINISTRATION
FORT COLLINS, CO 80527-2400

EXAMINER	
ALEJANDRO, RAYMOND	
ART UNIT	**PAPER NUMBER**
1745	

MAIL DATE	DELIVERY MODE
05/14/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/628,946	KEARL ET AL.	
	Examiner	Art Unit	
	Raymond Alejandro	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 March 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-64* is/are pending in the application.

4a) Of the above claim(s) *6, 8, 10-15, 18-27, 42-64* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5,7,9,16,17 and 28-41* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *28 July 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

This office action is responsive to the response dated 03/02/07 responding to the supplemental restriction requirement dated 02/09/07 and to the amendment filed 10/25/06. The applicant has overcome most of the objections and 35 USC 112 rejections. Refer to the abovementioned amendment for specific details on applicant's rebuttal arguments. However, the present claims are non-finally rejected over the same art reference but a new ground of rejection based upon a different interpretation of the reference is now presented for applicant's convenience and for the reasons of record. As such, rejection of the present claims follow:

Election/Restrictions

1. Claims 42-64 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on 06/23/06. See also office action 02/09/07 which maintained the previous restriction requirement.

2. As per the 02/09/07 office action, the claims of Group I (claims 1-35) and Group II (claims 36-41) were rejoined. Therefore, claims 1-35 and claims 36-41 are herein rejoined.

3. As per the 02/09/07 office action, a supplemental election requirement was set forth. Said action further delineated election of species based on separate and distinct categories (See office action dated 02/09/07). In response to the foregoing office action, applicant has provided a response dated 03/02/07.

4. Applicant's election with traverse of following species: **Category I**- the solid oxide electrolyte; **Category II**- species a) (steps of claims 7); **Category III**- the non-electrolyte

species; and **Category IV**- no election required because species d) in Category II was not elected (in sum, CLAIMS 1-4, 5, 7, 9, 16-17 and 28-41) in the reply filed on 03/02/07 is acknowledged. The traversal is on the ground(s) that "*the Examiner has not established that an undue examination burden would exist if all the species were examined together*" and because "*a chamber formed by the method of claim 7 may include either a solid oxide electrolyte or a proton-exchange membrane electrolyte (or both), and may include a chamber roof formed of an electrolyte*". This is not found persuasive because it is noted that as admitted by the applicant and disclosed in the specification, the present application contains a number of different embodiments as represented by the election of species delineated in the office action dated 02/09/07. Applicant has affirmed that the species identified by the Examiner are patentably distinct (See response of 03/02/07 at page 2, second last paragraph). Therefore, applicant's invention encompasses different and separated embodiments that are mutually exclusive. Applicant's attention is particularly directed to MPEP 809.02(a) which indicates how to identify species by illustrative figures, examples, mechanical means, particular materials, or other distinguishing characteristics (← emphasis added).

Additionally, the fact that a chamber formed by the method of claim 7 may include either a solid oxide electrolyte or a proton exchange membrane (or both), and may include a chamber roof formed of an electrolyte does not render the species not mutually exclusive. This is because the identified species of the chamber is related to different chamber structures per se rather than a chamber including different electrolyte materials. In other words, it has been identified that the claimed chamber encompasses separate and distinct chamber structures, thereby supporting the identification of species by chamber structures rather than by electrolyte materials. Thus,

mutually exclusive embodiments do exist when chamber forming steps/electrolyte are as follows: a) first chamber steps (claim 7)-solid oxide electrolyte, b) first chamber steps (claim 7)-proton exchange membrane electrolyte; c) second chamber steps (claim 11)-solid oxide electrolyte, d) second chamber steps (claim 11)-proton exchange membrane electrolyte; e) third chamber steps (claim 14)-solid oxide electrolyte, and f) third chamber steps (claim 14)-proton exchange membrane electrolyte and so on. In this instance, at least six (6) different sub-species are identified. Accordingly, serious burden would be raised if the search of such different species was made as required for the separate, distinct and mutually exclusive species.

The requirement is still deemed proper and is therefore made **FINAL**.

Information Disclosure Statement

5. The information disclosure statement (IDS) submitted on 07/28/03 had been previously considered by another examiner.

Drawings

6. The drawings were received on 07/28/03. These drawings are acceptable.

Claim Objections

7. Claims 1 and 36 are objected to because of the following informalities: all abbreviations (i.e. MEMS) should be changed to a clear terminology or nomenclature so as to have a better understanding of the claims. Appropriate correction is required.

8. Claims 36-41 are objected to because of the following informalities: the status identifier of the foregoing claims should be changed to original, previously presented or currently amended (if that is the case) as claims 36-41 are now considered on their merits. Appropriate correction is required.

Claim Rejections - 35 USC § 112

9. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10. Claims 1-4, 5, 7, 9, 16-17 and 28-41 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

11. Claims 1 and 36 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are: a) if both the anode and the cathode are in contact with the electrolyte, then it is immediately unclear how the deposition of the electrolyte upon the substrate takes place, or b) if the electrolyte is deposited upon the substrate, then it is immediately unclear how both the cathode or the anode contact the electrolyte. As best understood, applicant's intent is to deposit an electrolyte upon a substrate, therefore, at least one side of the electrolyte is in contact with the substrate and the other side thereof (only one side) would be available for contacting either the anode or the cathode, but not both. Further clarification is requisitioned.

12. Claims 1 and 36 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are: a) if both the anode and the cathode are in contact with the electrolyte, then it is immediately unclear how the deposition of the electrolyte upon the substrate takes place, or b) if the electrolyte is deposited upon the substrate, the it is immediately unclear how both the cathode or the anode contact the electrolyte. As best understood, applicant's intent is to deposit an electrolyte upon a substrate, therefore, at least one side of the electrolyte is in contact with the substrate and the other side thereof (only one side) would be available for contacting either the anode or the cathode, but not both. Further clarification is requisitioned. This rejection (i.e. omitting essential structural cooperative relationship) is also applied to the present claims because the present claim language raises uncertainties with respect to the final structure of the MEMS-based fuel cell.

13. The language "*at least part of the membrane portion*" in claim 41 is a relative term which renders the claim indefinite. The foregoing language is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. In this case, the combination of the terms "*at least part*" with "*the membrane portion*" fails to clearly set forth the intended scope of applicant's invention.

14. The term "suitable" in claim 7 (line 5) is a relative term which renders the claim indefinite. The foregoing is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be

reasonably apprised of the scope of the invention. *Currently, the extent or degree of how suitable a material can be to form a chamber is unknown.*

Claim Rejections - 35 USC § 102

15. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim Rejections - 35 USC § 103

16. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

17. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

18. Claims 3 and 38 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Jankowski et al 2003/0039874.

Jankowski et al discloses thin-film deposition techniques to form a MEMS-fuel cell system (P0044, 0033, 0042, Abstract, Title). Specifically, disclosed therein is that series of thin film materials such as an electrode/catalyst, electrolyte and electrode/catalyst can be formed by a variety of thin-film depositions techniques (P0044). Substrates 11, 14 and 16 are also present during the deposition (P0032-0033). Substrate 14 includes a fuel inlet 15, and substrate 16 includes an oxidant inlet 17; additionally, host substrate 11 is provided with a plurality of openings, channels, pores or windows (P0032). Jankowski et al disclose incorporation of manifold structure within the host substrate (P0033).

Figures 1-3 below show the thin-film deposited MEMS-fuel cell of Jankowski et al. It can be appreciated from observing Figure 1, that substrates 11, 14, and 16 provide cavities and opening/channels or inlets 15, 17, respectively. *These cavities can be taken as chambers.*

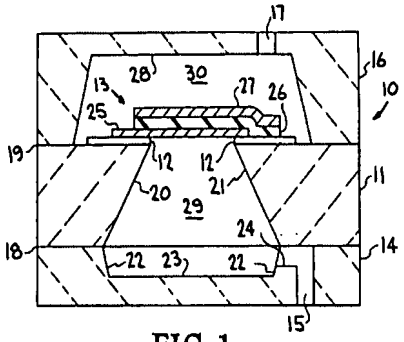

FIG. 1

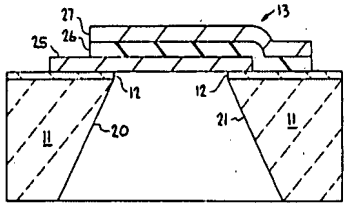

FIG. 2

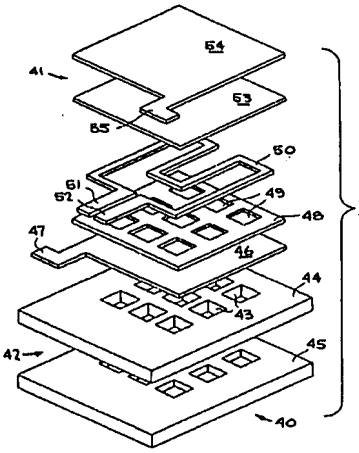

FIG. 3

Examiner's note: *it is noted that the instant claims are being construed as product-by-process claims (i.e. a fuel cell being made by the method of either claim 1 or claim 36) and that the product itself does not depend on the process of making it. Accordingly, in a product-by-process claim, the patentability of a product does not depend on its method of production. In that, it is further noted that the product in the instant claims is the same as or obvious over the product of the prior art.* ***In re Thorpe 777 F.2d 695, 698, 227 USPQ 964,966 (Fed Cir. 1985) and MPEP 2113.*** *As a result, the process steps of a product-by-process claim do not impart any significant property or structure to the claimed end product. And, if there is any difference, the difference would have been minor and obvious. Therefore, the present claims are unpatentable over a reference that satisfies the claimed compositional or physical or property or structural limitations, and/or a reference that discloses a product made by a process that reasonably substantially comprises every limitation of the claimed process.*

Therefore, Jankowski et al anticipate the present claims However, if the claims are not anticipated the claims are obvious as it has been held similar products claimed in product-by-process limitations are obvious *In re Brown, 459 F.2d 531, 535, 173 USPQ 685, 688 (CCPA 1972)* and *In re Fessmann, 489 F.2d 742, 744 180 USPQ 324, 326 (CCPA 1974);See also In re*

Best, 195 USPQ 430 (CCPA 1977) [prove that prior art products do not necessarily or inherently possess characteristics] & *Ex parte Gray, 10 USPQ2d 1922 (BPAI 1989)* [needs to show that the claimed process imparts unexpected property or structure]*(Refer to MPEP 2113: Product-by-Process Claims).*

Claim Rejections - 35 USC § 103

19. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

20. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

21. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later

invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

22. Claims 1, 4, 5, 7, 9, 16-17, 28-37 and 40-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jankowski et al 2003/0039874.

The present claims are geared towards a fabrication method for a MEMS-based fuel cell wherein the disclosed inventive concept comprises the specific deposition steps.

As to claims 1, 16-17 and 36-37:

Jankowski et al discloses thin-film deposition techniques to form a MEMS-fuel cell system (P0044, 0033, 0042, Abstract, Title). Specifically, disclosed therein is that series of thin film materials such as an electrode/catalyst, electrolyte and electrode/catalyst can be formed by a variety of thin-film depositions techniques (P0044). Substrates 11, 14 and 16 are also present during the deposition (P0032-0033). Substrate 14 includes a fuel inlet 15, and substrate 16 includes an oxidant inlet 17; additionally, host substrate 11 is provided with a plurality of openings, channels, pores or windows (P0032). Jankowski et al disclose incorporation of manifold structure within the host substrate (P0033).

Figures 1-3 below show the thin-film deposited MEMS-fuel cell of Jankowski et al. It can be appreciated from observing Figure 1, that substrates 11, 14, and 16 provide cavities and opening/channels or inlets 15, 17, respectively. *These cavities can be taken as chambers.*

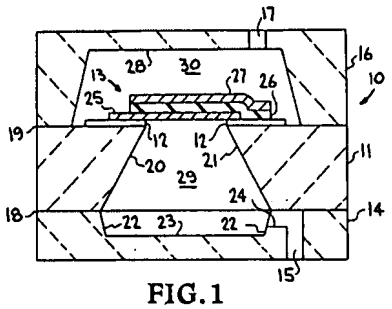

FIG. 1

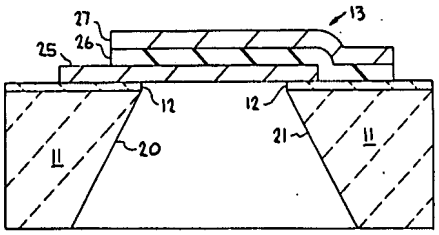

FIG. 2

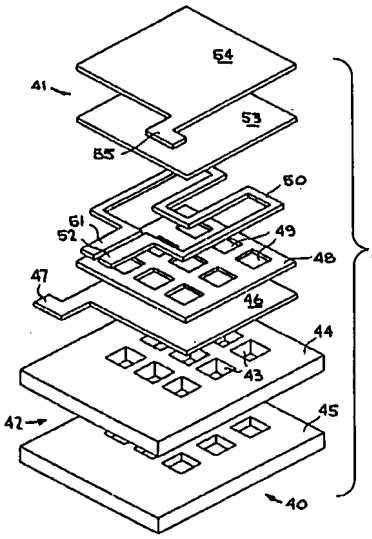

FIG. 3

As to claim 4:

Enlarged portion of Figure 1 illustrates that the chamber formed by the substrates 11 and 14 at least extends over at least the entire anode (electrode 25).

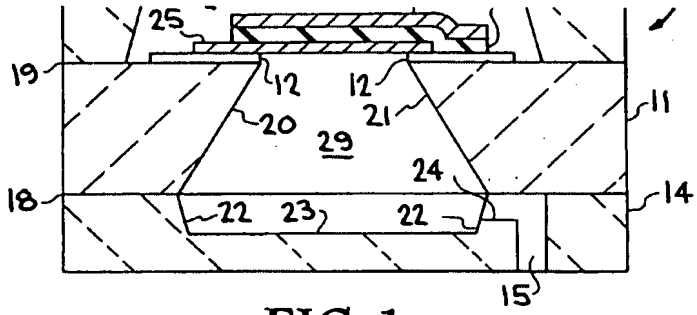

FIG. 1

As to claim 5:

Solid oxide electrolytes are disclosed (Abstract, P0029, 0031-0032, 0037-0038).

As to claims 7, 28 and 40-41:

Jankowski et al disclose that an area of the substrate material is removed following deposition of the electrode-electrolyte-electrode layers 13 (P0032). Patterning by etching is disclosed (P0031, 0033, 0035, 0042). *It is to be noted that the removal of substrate material also encompasses patterning the removed area.*

As to claim 9:

Jankowski et al discloses substrate materials such as a nitride layer (P0032), or Si-based substrates (P0031). *These are non-electrolyte materials.*

As to claims 29-35 and claim 36:

Jankowski et al makes known that substrate 14 includes a fuel inlet 15, and substrate 16 includes an oxidant inlet 17; additionally, host substrate 11 is provided with a plurality of openings, channels, pores or windows (P0032, 0042/FIGURE 1). Jankowski et al disclose incorporation of manifold structure within the host substrate (P0033, 0039). *Substrates 14 and 16 represent two different cavities/chambers including openings 15 and 17, respectively.*

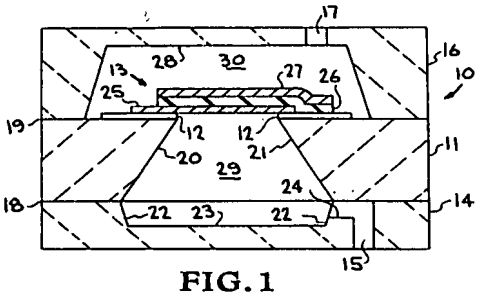

FIG. 1

Examiner's note: *The recitation "adapted to" or "adapted for" clauses are examples of claim language that may raise a question as to the limiting effect of the language in a claim (See MPEP 2111.04 [R-3] "Adapted to," "Adapted for," "Wherein," and "Whereby" Clauses). Claim scope is not limited by claim language that suggests or makes optional but does not*

require steps to be performed, or by claim language that does not limit a claim to a particular structure. See Hoffer v. Microsoft Corp., 405 F.3d 1326, 1329, 74 USPQ2d 1481, 1483 (Fed. Cir. 2005) & Minton v. Nat 'l Ass 'n of Securities Dealers, Inc., 336 F.3d 1373, 1381, 67 USPQ2d 1614, 1620 (Fed. Cir. 2003).

Jankowski et al disclose forming a MEMS-fuel cell system as seen and described above. However, the preceding prior art reference does not expressly disclose the specific order of the deposition steps.

In view of the above, it would have been obvious to a person possessing a level of ordinary skill in the pertinent art at the time the invention was made to perform Jankowski et al's deposition steps in the order or sequence as instantly claimed because a change in sequence of adding ingredients is prima-facie obvious. Consequently, reversing the order of the prior art process steps (*Ex parte Rubin 128 USPQ 440*); selection of any order of performing process steps (*In re Burhans 69 USPQ 330*); or selection of any order of mixing ingredients (*In re Gibson 5USPQ 230*) are all prima facie obvious in the absence of new or unexpected results (**See MPEP 2144.04 [R-1] Legal Precedent as Source of Supporting Rationale: IV. Changes in Sequence of Adding Ingredients**). *Particularly, applicant's invention is obvious by operation of law as Ex parte Rubin , 128 USPQ 440 (Bd. App. 1959) is settled law. (Prior art reference disclosing a process of making a laminated sheet wherein a base sheet is first coated with a metallic film and thereafter impregnated with a thermosetting material was held to render prima facie obvious claims directed to a process of making a laminated sheet by reversing the order of the prior art process steps.).*

23. Claims 2 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jankowski et al 2003/0039874 as applied to claims 1 and 36 above, and further in view of Sasahara et al 2002/0012825.

Jankowski et al is applied, argued and incorporated herein for the reasons manifested above. However, the preceding prior art reference fails to explicitly teach the step of patterning the electrolyte.

Sasahara et al disclose a fuel cell wherein the electrolyte/electrode interface has been patterned (Title/Abstract). Sasahara et al disclose that it is known to employ micromachining techniques to pattern the electrolyte (ABSTRACT). Method of making a patterned electrolyte are also disclosed (CLAIMS 21-29) and/or creation of a patterned electrolyte (P0054-0057).

In view of the above, it would have been obvious to a person possessing a level of ordinary skill in the pertinent art at the time the invention was made to provide the step of patterning the electrolyte of Jankowski et al as taught by Sasahara et al because Sasahara et al teaches that the step of patterning an electrolyte allows very precise feature definition thereof, and fuel cells comprising a patterned electrolyte exhibit significantly enhanced volumetric power density when compared with conventional fuel cells. Therefore, a very precise feature definition of an electrolyte and an enhanced volumetric power density fuel cell are the beneficial effects of performing Sasahara et al's patterning step in the electrolyte of Jankowski et al.

Allowable Subject Matter

24. Any indication of allowable subject matter as set forth in the office action of 07/28/06 has been withdrawn herein in view of the ground of rejection discussed supra incorporating a different interpretation of the prior art reference.

Response to Arguments

25. Applicant's arguments with respect to the foregoing claims have been fully considered but are moot in view of the new ground(s) of rejection. A new ground of rejection based upon a different interpretation of the reference has been set forth supra.

26. This application was reassigned to a new examiner.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Raymond Alejandro
Primary Examiner
Art Unit 1745

RAYMOND ALEJANDRO
PRIMARY EXAMINER